IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Original): A direct frequency modulation apparatus comprising:

a voltage-controlled oscillator which comprises a first voltage-variable capacitive circuit that is so constituted as to change a capacitance value by a first voltage applied to a first control terminal, and a second voltage-variable capacitive circuit that is so constituted as to change a capacitance value by a second voltage applied to a second control terminal, and oscillates at frequencies corresponding to the first and second voltages applied to the first and second control terminals;

a phase-locked loop which is connected to the first control terminal, locks an oscillation frequency of the voltage-controlled oscillator to a predetermined frequency, and then holds the first voltage applied to the first control terminal; and

a voltage generation circuit which is connected to the second control terminal, applies the second voltage to the second control terminal during a locking period of the phase-locked loop, and after the locking period of the phase-locked loop, generates a modulation voltage obtained by changing the second voltage by a third voltage in accordance with input data, the second voltage being applied to the second control terminal,

wherein temperature dependency of the second voltage is higher than temperature dependency of a potential difference between two terminals of an element which provides a capacitance value in the second voltage-variable capacitive circuit.

Claim 2 (Original): An apparatus according to claim 1, wherein the third voltage is proportional to the second voltage.

Claim 3 (Original): An apparatus according to claim 1, wherein the voltage generation circuit comprises a low-pass filter having a reference voltage generation circuit which generates the second voltage having positive temperature dependency, a digital-to-analog converter which increases or decreases the second voltage output from the reference voltage generation circuit by the third voltage in accordance with the input data and outputs the second voltage, and a filter which receives the voltage output from the digital-to-analog converter and outputs the modulation voltage.

Claim 4 (Original): An apparatus according to claim 1, wherein the first voltage includes a voltage which sets a channel frequency, and the second voltage includes a voltage which has positive temperature dependency and increases or decreases by the third voltage in accordance with the input data.

Claim 5 (Original): A direct frequency modulation apparatus comprising:

a voltage-controlled oscillator which comprises a first voltage-variable capacitive circuit that is so constituted as to change a capacitance value by a first voltage applied to a first control terminal, and a second voltage-variable capacitive circuit that is so constituted as to change a capacitance value by a second voltage applied to a second control terminal, and oscillates at frequencies corresponding to the first and second voltages applied to the first and second control terminals;

a phase-locked loop which is connected to the first control terminal, locks an oscillation frequency of the voltage-controlled oscillator to a predetermined frequency, and then holds the first voltage applied to the first control terminal; and

a voltage generation circuit which is connected to the second control terminal, applies the second voltage to the second control terminal during a locking period of the phase-locked

loop, and after the locking period of the phase-locked loop, generates a modulation voltage obtained by changing the second voltage by a third voltage in accordance with input data, the second voltage being applied to the second control terminal,

wherein the second voltage is given by a difference between a fourth voltage whose temperature dependency is lower than temperature dependency of a potential difference between two terminals of an element which provides a capacitance value in the second voltage-variable capacitive circuit, and a fifth voltage proportional to the potential difference between the two terminals of the element.

Claim 6 (Original): An apparatus according to claim 5, wherein the third voltage is proportional to the second voltage.

Claim 7 (Original): An apparatus according to claim 5, wherein the voltage generation circuit comprises a low-pass filter having a band gap reference circuit, a temperature compensation voltage generation circuit which generates the second voltage by giving positive temperature dependency to a reference voltage output from the band gap reference circuit, a digital-to-analog converter which increases or decreases the second voltage output from the temperature compensation voltage generation circuit by the third voltage in accordance with the input data and outputs the second voltage, and a filter which receives the voltage output from the digital-to-analog converter and outputs the modulation voltage.

Claim 8 (Original): An apparatus according to claim 5, wherein the first voltage includes a voltage which sets a channel frequency, and the second voltage includes a voltage

which has positive temperature dependency and increases or decreases by the third voltage in accordance with the input data.

Claim 9 (Original): A direct frequency modulation apparatus comprising:

a voltage-controlled oscillator which comprises a first voltage-variable capacitive circuit that is so constituted as to change a capacitance value by a first voltage applied to a first control terminal, and a second voltage-variable capacitive circuit that is so constituted as to change a capacitance value by a second voltage applied to a second control terminal, and oscillates at frequencies corresponding to the first and second voltages applied to the first and second control terminals;

a phase-locked loop which is connected to the first control terminal, locks an oscillation frequency of the voltage-controlled oscillator to a predetermined frequency, and then holds the first voltage applied to the first control terminal; and

a voltage generation circuit which is connected to the second control terminal, applies the second voltage to the second control terminal during a locking period of the phase-locked loop, and after the locking period of the phase-locked loop, generates a modulation voltage obtained by changing the second voltage by a third voltage in accordance with input data, the second voltage being applied to the second control terminal,

wherein the second voltage is given by a fourth voltage whose temperature dependency is lower than temperature dependency of a potential difference between two terminals of an element which provides a capacitance value in the second voltage-variable capacitive circuit.

Claim 10 (Original): An apparatus according to claim 9, wherein the third voltage is given by a sum of a fifth voltage proportional to the second voltage and a sixth voltage

proportional to the potential difference between the two terminals of the element which provides the capacitance value in the second voltage-variable capacitive circuit.

Claim 11 (Original): An apparatus according to claim 9, wherein the voltage generation circuit comprises a low-pass filter having a band gap reference circuit, and a wave-shaping circuit which generates the second voltage by giving positive temperature dependency to a reference voltage output from the band gap reference circuit, increases or decreases the second voltage by the third voltage in accordance with the input data, and outputs the second voltage.

Claim 12 (Original): An apparatus according to claim 9, wherein the first voltage includes a voltage which sets a channel frequency, and the second voltage includes a voltage which has positive temperature dependency and increases or decreases by the third voltage in accordance with the input data.

Claim 13 (Currently Amended): A direct frequency modulation apparatus comprising:

a voltage-controlled oscillator whose oscillation frequency changes on the basis of voltages applied to first and second control terminals, the voltage-controlled oscillator comprising

first and second voltage-variable capacitive elements having first terminals commonly connected to the first control terminal,

third and fourth voltage-variable capacitive elements having first terminals commonly connected to the second control terminal,

a first capacitor having one electrode connected to a second terminal of the third voltage-variable capacitive element and the other electrode connected to a second terminal of the first voltage-variable capacitive element,

a second capacitor having one electrode connected to a second terminal of the fourth voltage-variable capacitive element and the other electrode connected to a second terminal of the second voltage-variable capacitive element, [[and]]

an inductor which is connected between the second terminals of the first and second voltage-variable capacitive elements;

a first control circuit that controls potentials at said one electrode of the first capacitor and the second terminal of the third voltage-variable capacitive element;

a second control circuit that controls potentials at said one electrode of the second capacitor and the second terminal of the fourth voltage-variable capacitive element; and

a bias circuit that applies a bias voltage to the first and second control circuits,

wherein a temperature dependency of a potential difference between a voltage which is applied from the second control circuit to said one electrode of the second capacitor and the second terminal of the fourth voltage-variable capacitive element and the bias voltage output from the bias circuit is approximate to a temperature dependency of a potential difference between the first and second terminals of the third voltage-variable capacitive element and is approximate to a temperature dependency of a potential difference between the first and second terminals of the fourth voltage-variable capacitive element.

Claim 14 (Canceled).

Claim 15 (Currently Amended): An apparatus according to claim [[14]]13, wherein the third and fourth voltage-variable capacitive elements have a voltage-current characteristic,

and the bias voltage output from the bias circuit is generated from a voltage generated when a predetermined current is supplied to the third and fourth voltage-variable capacitive elements.

Claim 16 (Currently Amended): A direct frequency modulation apparatus comprising:

a voltage-controlled oscillator whose oscillation frequency changes on the basis of voltages applied to first and second control terminals, the voltage-controlled oscillator comprising

at least one inductor,

first and second voltage-variable capacitive elements having first terminals commonly connected to the first control terminal,

third and fourth voltage-variable capacitive elements having first terminals commonly connected to the second control terminal,

a first capacitor having one electrode connected to a second terminal of the first voltage-variable capacitive element and the other electrode connected to a first terminal of the inductor,

a second capacitor having one electrode connected to a second terminal of the second voltage-variable capacitive element and the other electrode connected to a second terminal of the inductor,

a third capacitor having one electrode connected to a second terminal of the third voltage-variable capacitive element and the other electrode connected to the first terminal of the inductor, [[and]]

a fourth capacitor having one electrode connected to a second terminal of the fourth voltage-variable capacitive element and the other electrode connected to the second terminal of the inductor;

a first control circuit which controls potentials at said one electrode of the first capacitor and the second terminal of the first voltage-variable capacitive element;

a second control circuit which controls potentials at said one electrode of the second capacitor and the second terminal of the second voltage-variable capacitive element;

a third control circuit which controls potentials at said one electrode of the third capacitor and the second terminal of the third voltage-variable capacitive element;

a fourth control circuit which controls potentials at said one electrode of the fourth capacitor and the second terminal of the fourth voltage-variable capacitive element; and

a bias circuit that applies a bias voltage to the first to fourth control circuits, wherein a temperature dependency of a potential difference between a voltage which is applied from the third control circuit to said one electrode of the third capacitor and the second terminal of the third voltage-variable capacitive element and the bias voltage output from the bias circuit is approximate to a temperature dependency of a potential difference between the first and second terminals of the third voltage-variable capacitive element and is approximate to a temperature dependency of a potential difference of the fourth voltage-variable capacitive element.

Claim 17 (Canceled).

Claim 18 (Canceled).

Claim 19 (Currently Amended): An apparatus according to claim [[18]]16, wherein the third and fourth voltage-variable capacitive elements have a voltage-current characteristic, and the bias voltage output from the bias circuit is generated from a voltage generated when a predetermined current is supplied to the third and fourth voltage-variable capacitive elements.